ABC Formula/Conversion Table

$$\text{Acid Feed Rate} = \frac{(\text{Waste Flow})(\text{Waste Normality})}{\text{Acid Normality}}$$

$$\text{Alkalinity} = \frac{(\text{mL of Titrant})\ (\text{Acid Normality})\ (50{,}000)}{\text{mL of Sample}}$$

Area of Circle = (.785) (Diameter^2) or (Π)(Radius^2)

Area of Cylinder = [(.785) (Diameter^2)] + [(Π)(Diameter)(Height)]

Area of Rectangle = (Length) (Width)

$$\text{Area of Triangle} = \frac{(\text{Base})\ (\text{Height})}{2}$$

$$\text{Chemical Feed Pump Setting, \% Stroke} = \frac{(\text{Desired Flow})\ (100\%)}{\text{Maximum Flow}}$$

$$\text{Chemical Feed Pump Setting, mL/min} = \frac{(\text{Flow, MGD})(\text{Dose, mg/L})(3.785\ \text{L/gal})(1{,}000{,}000\ \text{gal/MG})}{(\text{Liquid, mg/mL})(24\ \text{hr/day})(60\ \text{min/hr})}$$

Circumference of Circle = (3.14) (Diameter)

$$\text{Composite Sample Single Portion} = \frac{(\text{Instantaneous Flow})\ (\text{Total Sample Volume})}{(\text{Number of Portions})\ (\text{Average Flow})}$$

$$\text{Detention Time} = \frac{\text{Volume}}{\text{Flow}}$$

$$\text{Digested Sludge Remaining, \%} = \frac{(\text{Raw Dry Solids})\ (\text{Ash Solids})\ (100\%)}{(\text{Digested Dry Solids})\ (\text{Digested Ash Solids})}$$

$$\text{Discharge} = \frac{\text{Volume}}{\text{Time}}$$

Dosage, lbs/day = (mg/L) (8.34) (MGD)

$$\text{Efficiency, \%} = \frac{(\text{In} - \text{Out})\ (100\%)}{\text{In}}$$

$$\text{Feed rate, lbs/day} = \frac{(\text{Dosage, mg/L})\ (\text{Capacity, MGD})(8.34\ \text{lbs/gal})}{(\text{Available fluoride ion})\ (\text{Purity})}$$

$$\text{Feed rate, gal/min (Saturator)} = \frac{(\text{Plant capacity, gal/min})\ (\text{Dosage, mg/L})}{(18{,}000\ \text{mg/L})}$$

$$\text{Filter Backwash Rate} = \frac{\text{Flow}}{\text{Filter Area}}$$

$$\text{Filter Yield, lbs/hr/sq ft} = \frac{(\text{Solids Loading, lbs/day})(\text{Recovery, \%/100\%})}{(\text{Filter operation, hr/day})(\text{Area, ft}^2)}$$

$$\text{Food/Microorganism Ratio} = \frac{\text{BOD, lbs/day}}{\text{MLVSS, lbs}}$$

$$\text{Gallons/Capita/Day} = \frac{\text{Gallons/Day}}{\text{Population}}$$

$$\text{Hardness} = \frac{\text{(mL of Titrant) (1,000)}}{\text{mL of Sample}}$$

$$\text{Horsepower} = \frac{\text{(Flow, gpm) (Head, ft)}}{\text{(3,960) (Efficiency)}}$$

$$\text{Hydraulic Loading Rate} = \frac{\text{Flow}}{\text{Area}}$$

$$\text{Mean Cell Residence Time (MCRT)} = \frac{\text{Suspended Solids in Aeration System, lbs}}{\text{SS Wasted, lbs/day + SS Lost, lbs/day}}$$

$$\text{Organic Loading Rate} = \frac{\text{Organic Load, lbs BOD/day}}{\text{Volume}}$$

$$\text{Oxygen Uptake} = \frac{\text{Oxygen Usage}}{\text{Time}}$$

$$\text{Population Equivalent} = \frac{\text{(Flow MGD) (BOD, mg/L) (8.34 lbs/gal)}}{\text{lbs BOD/day/person}}$$

$$\text{Reduction in Flow, \%} = \frac{\text{(Original Flow- Reduced Flow)(100\%)}}{\text{Original Flow}}$$

$$\text{Slope} = \frac{\text{Drop or Rise}}{\text{Distance}}$$

$$\text{Sludge Age} = \frac{\text{Mixed Liquor Solids, lbs}}{\text{Primary Effluent Solids, lbs/day}}$$

$$\text{Sludge Index} = \frac{\text{\%Settleable Solids}}{\text{\%Suspended Solids}}$$

$$\text{Sludge Volume Index} = \frac{\text{(Settleable Solids, \%) (10,000)}}{\text{MLSS, mg/L}}$$

$$\text{Solids Applied, lbs/day} = \text{(Flow, MGD) (Concentration) (8.34 lbs/gal)}$$

$$\text{Solids Concentration} = \frac{\text{Weight}}{\text{Volume}}$$

$$\text{Solids Loading, lbs/day/sq ft} = \frac{\text{Solids Applied, lbs/day}}{\text{Surface Area, sq ft}}$$

$$\text{Solids, mg/L} = \frac{\text{(Dry Solids, grams) (1,000,000)}}{\text{mL of sample}}$$

$$\text{Surface Loading Rate} = \frac{\text{Flow}}{\text{Area}}$$

$$\text{Velocity} = \frac{\text{Flow}}{\text{Area}} \text{ or } \frac{\text{Distance}}{\text{Time}}$$

$$\text{Volatile Solids, \%} = \frac{(\text{Dry Solids} - \text{Ash Solids})\,(100\%)}{\text{Dry Solids}}$$

Volume of Rectangle = (Length) (Width) (Height)

Volume of Cone = (1/3) (.785) (Diameter^2) (Height)

Volume of Cylinder = (.785) (Diameter^2) (Height)

Waste Milliequivalent = (mL) (Normality)

$$\text{Waste Normality} = \frac{(\text{Titrant Volume})\,(\text{Titrant Normality})}{\text{Sample Volume}}$$

$$\text{Weir Overflow Rate} = \frac{\text{Flow}}{\text{Weir Length}}$$

Conversion Factors:

1 acre = 43,560 square feet
1 cubic foot = 7.5 gallons
1 foot = 0.305 meters
1 gallon = 3.79 liters
1 gallon = 8.34 pounds
1 grain per gallon = 17.1 mg/L
1 horsepower = 0.746 kilowatts
1 million gallons per day = 694 gallons per minute
1 pound = 0.454 kilograms
1 pound per square inch = 2.31 feet of water
Degrees Celsius = (Degrees Fahrenheit - 32) ($^5/_9$)
Degrees Fahrenheit = (Degrees Celsius) ($^9/_5$) + 32
1% = 10,000 mg/L

Abbreviations:

BOD	biochemical oxygen demand
ft	feet
gpd	gallons per day
gpg	grains per gallon
gpm	gallons per minute
lbs	pounds
mg/L	milligrams per liter
MGD	million gallons per day
mL	milliliter
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids